

CLAIMS

1. An encoding method for encoding an original image, comprising:
  - 5           a decomposition step of decomposing an input original image into M (M is an integer and  $M > 2$ ) uniform subbands; and
  - an encoding step of encoding signals, by using an embedded type entropy encoding method,  
10       obtained by decomposing the original image into uniform subbands.
2. The encoding method as claimed in claim 1, the coding method further comprising a  
15       quantization step of quantizing the signals obtained by the decomposition step, wherein signals obtained by the quantization step are encoded in the encoding step.
- 20       3. The encoding method as claimed in claim 1, wherein a uniform decomposing filter bank is used in the decomposition step, and EBCOT used in the still image international standard JPEG 2000 is used in the encoding step.
- 25       4. The encoding method as claimed in claim 1, wherein coded data obtained in the encoding step include information of resolution levels defined in ascending order of subband in the decomposed  
30       subbands.
5. The encoding method as claimed in claim 4, wherein the coded data include information of resolution levels for a vertical direction and a  
35       horizontal direction, respectively, in an image.
6. An encoding method of encoding an

original image, the encoding method comprising:

a transformation step of transforming an input original image into a plurality of coefficients by orthogonal transform; and  
5 an encoding step of encoding the coefficients by using an embedded type entropy encoding method.

7. The encoding method as claimed in claim  
10 6, wherein coded data obtained in the encoding step include information of resolution levels defined in ascending order of frequency in frequency components corresponding to the coefficients.

15 8. A decoding method of decoding coded data with a resolution of  $N/M$  times ( $M$  and  $N$  are integers, and  $1 \leq N \leq M$  and  $M > 2$ ) that of an original image, the decoding method comprising:

a decoding step of receiving the coded  
20 data that are encoded by decomposing the original image into  $M$  uniform subbands, extracting  $N$  signals from decomposed signals from a low frequency side, and decoding the  $N$  signals by using an entropy decoding method; and

25 a bandwidth synthesizing step of synthesizing the  $N$  signals that are decoded.

9. The decoding method as claimed in claim  
30 8, the decoding method further comprising an inverse quantization step of inverse-quantizing the signals obtained by the decoding step, wherein signals that are obtained by the inverse quantization step are synthesized in the bandwidth synthesizing step.

35 10. The decoding method as claimed in claim 8, wherein EBCOT used in the still image international standard JPEG 2000 is used as the

entropy decoding method in the decoding step, and a uniform decomposing filter bank is used in the bandwidth synthesizing step.

5           11. The decoding method as claimed in claim 8, the decoding method further comprising a calculation step of obtaining a resolution of the original image and a predetermined resolution, and calculating the value N suitable for the  
10           predetermined resolution by using the resolution of the original image and the decomposition number M.

          12. A decoding method of decoding coded data with a resolution of  $N/M$  times ( $M$  and  $N$  are  
15           integers, and  $1 \leq N \leq M$  and  $M > 2$ ) that of an original image, the decoding method comprising:

          a decoding step of receiving the coded data that are encoded by decomposing the original image into  $M$  coefficients of frequency components,  
20           extracting  $N$  signals from decomposed signals from a low frequency component side, and decoding the  $N$  signals by using an entropy decoding method; and

          a bandwidth synthesizing step of synthesizing the  $N$  signals that are decoded.

25           13. An encoding apparatus for encoding an original image, the encoding apparatus comprising:

          a decomposition part decomposing an input original image into  $M$  ( $M$  is an integer and  $M > 2$ )  
30           uniform subbands; and

          an encoding part encoding signals, by using an embedded type entropy encoding method, obtained by decomposing the original image into uniform subbands.

35           14. The encoding apparatus as claimed in claim 13, the encoding apparatus further comprising

a quantization part quantizing the signals obtained by the decomposition part, wherein signals obtained by the quantization part are encoded in the encoding part.

5

15. The encoding apparatus as claimed in claim 13, wherein a uniform decomposing filter bank is used in the decomposition part, and EBCOT used in the still image international standard JPEG 2000 is used in the encoding part.

10

16. The encoding apparatus as claimed in claim 13, wherein coded data obtained in the encoding part include information of resolution levels defined in ascending order of subband in the decomposed subbands.

15

17. The encoding apparatus as claimed in claim 16, wherein the coded data include information of resolution levels for a vertical direction and a horizontal direction, respectively, in an image.

20

18. An encoding apparatus for encoding an original image, the encoding apparatus comprising:  
a transformation part transforming an input original image into a plurality of coefficients by orthogonal transform; and  
an encoding part encoding the coefficients by using an embedded type entropy encoding method.

25

30

19. The encoding apparatus as claimed in claim 18, wherein coded data obtained in the encoding part include information of resolution levels defined in ascending order of frequency in frequency components corresponding to the coefficients.

35

20. A decoding apparatus for decoding coded data with a resolution of  $N/M$  times ( $M$  and  $N$  are integers, and  $1 \leq N \leq M$  and  $M > 2$ ) that of an original image, the decoding apparatus comprising:

- 5           a decoding part receiving the coded data that are encoded by decomposing the original image into  $M$  uniform subbands, extracting  $N$  signals from decomposed signals from a low frequency side, and decoding the  $N$  signals by using an entropy decoding  
10 method; and  
          a bandwidth synthesizing part synthesizing the  $N$  signals that are decoded.

21. The decoding apparatus as claimed in  
15 claim 20, the decoding apparatus further comprising an inverse quantization part inverse-quantizing the signals obtained by the decoding part, wherein signals that are obtained by the inverse  
quantization part are synthesized in the bandwidth  
20 synthesizing part.

22. The decoding apparatus as claimed in claim 20, wherein EBCOT used in the still image international standard JPEG 2000 is used as the  
25 entropy decoding method in the decoding part, and a uniform decomposing filter bank is used in the bandwidth synthesizing part.

23. The decoding apparatus as claimed in  
30 claim 20, the decoding apparatus further comprising a calculation part obtaining a resolution of the original image and a predetermined resolution, and calculating the value  $N$  suitable for the  
predetermined resolution by using the resolution of  
35 the original image and the decomposition number  $M$ .

24. A decoding apparatus of decoding coded

data with a resolution of  $N/M$  times ( $M$  and  $N$  are integers, and  $1 \leq N \leq M$  and  $M > 2$ ) that of an original image, the decoding apparatus comprising:

5 a decoding part receiving the coded data that are encoded by decomposing the original image into  $M$  coefficients of frequency components, extracting  $N$  signals from decomposed signals from a low frequency component side, and decoding the  $N$  signals by using an entropy decoding method; and  
10 a bandwidth synthesizing part synthesizing the  $N$  signals that are decoded.

25. A program for causing a computer to perform encoding processes for an original image,  
15 wherein the program causes the computer to perform:  
a decomposition step of decomposing an input original image into  $M$  ( $M$  is an integer and  $M > 2$ ) uniform subbands; and

an encoding step of encoding signals, by  
20 using an embedded type entropy encoding method, obtained by decomposing the original image into uniform subbands.

26. The program as claimed in claim 25,  
25 wherein the program further causes the computer to perform a quantization step of quantizing the signals obtained by the decomposition step, wherein signals obtained by the quantization step are encoded in the encoding step.

30

27. A program for causing a computer to perform encoding processes for an original image, wherein the program causes the computer to perform:  
a transformation step of transforming an  
35 input original image into a plurality of coefficients by orthogonal transform; and  
an encoding step of encoding the

coefficients by using an embedded type entropy encoding method.

28. A program for causing a computer to  
5 perform decoding processes for decoding coded data  
with a resolution of  $N/M$  times ( $M$  and  $N$  are integers,  
and  $1 \leq N \leq M$  and  $M > 2$ ) that of an original image,  
wherein the program causes the computer to perform:  
a decoding step of receiving the coded  
10 data that are encoded by decomposing the original  
image into  $M$  uniform subbands, extracting  $N$  signals  
from decomposed signals from a low frequency side,  
and decoding the  $N$  signals by using an entropy  
decoding method; and  
15 a bandwidth synthesizing step of  
synthesizing the  $N$  signals that are decoded.

29. The program as claimed in claim 28,  
the program further causing the computer to perform  
20 an inverse quantization step of inverse-quantizing  
the signals obtained by the decoding step, wherein  
signals that are obtained by the inverse  
quantization step are synthesized in the bandwidth  
synthesizing step.

25 30. A program for causing a computer to  
perform decoding processes for decoding coded data  
with a resolution of  $N/M$  times ( $M$  and  $N$  are integers,  
and  $1 \leq N \leq M$  and  $M > 2$ ) that of an original image,  
30 wherein the program causes the computer to perform:  
a decoding step of receiving the coded  
data that are encoded by decomposing the original  
image into  $M$  coefficients of frequency components,  
extracting  $N$  signals from decomposed signals from a  
35 low frequency component side, and decoding the  $N$   
signals by using an entropy decoding method; and  
a bandwidth synthesizing step of

synthesizing the N signals that are decoded.

31. A computer readable recording medium that records a program for causing a computer to  
5 perform encoding processes for an original image, wherein the program causes the computer to perform:  
a decomposition step of decomposing an input original image into M (M is an integer and  $M > 2$ ) uniform subbands; and  
10 an encoding step of encoding signals, by using an embedded type entropy encoding method, obtained by decomposing the original image into uniform subbands.

32. The computer readable recording medium as claimed in claim 31, wherein the program further causes the computer to perform a quantization step of quantizing the signals obtained by the  
decomposing step, wherein signals obtained by the  
20 quantization step are encoded in the encoding step.

33. A computer readable recording medium that records a program for causing a computer to perform encoding processes for an original image,  
25 wherein the program causes the computer to perform:  
a transformation step of transforming an input original image into a plurality of coefficients by orthogonal transform; and  
an encoding step of encoding the  
30 coefficients by using an embedded type entropy encoding method.

34. A computer readable recording medium that records a program for causing a computer to  
35 perform decoding processes for decoding coded data with a resolution of N/M times (M and N are integers, and  $1 \leq N \leq M$  and  $M > 2$ ) that of an original image,



wherein the program causes the computer to perform:

5       a decoding step of receiving the coded  
data that are encoded by decomposing the original  
image into M uniform subbands, extracting N signals  
from decomposed signals from a low frequency side,  
and decoding the N signals by using an entropy  
decoding method; and

10       a bandwidth synthesizing step of  
synthesizing the N signals that are decoded.

35. The computer readable recording medium  
as claimed in claim 34, the program further causing  
the computer to perform an inverse quantization step  
of inverse-quantizing the signals obtained by the  
15       decoding step, wherein signals that are obtained by  
the inverse quantization step are synthesized in the  
bandwidth synthesizing step.

36. A computer readable recording medium  
20       that records a program for causing a computer to  
perform decoding processes for decoding coded data  
with a resolution of N/M times (M and N are integers,  
and  $1 \leq N \leq M$  and  $M > 2$ ) that of an original image,  
wherein the program causes the computer to perform:

25       a decoding step of receiving the coded  
data that are encoded by decomposing the original  
image into M coefficients of frequency components,  
extracting N signals from decomposed signals from a  
low frequency component side, and decoding the N  
30       signals by using an entropy decoding method; and

      a bandwidth synthesizing step of  
synthesizing the N signals that are decoded.

35